

Network-Optional Warfare (NOW) - Operational Concepts

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Problem Statement

- Network-centric warfare (NCW) is a highly successful organizing principle, indeed ubiquitous
- Unintended consequences include
 - Loss of “radio silence” Emissions Control (EMCON) for communications, sensor search
 - Loss of reduced-transmission capabilities due to over-reliance on high-bandwidth links
 - Corresponding loss of coherent cross-platform tactical signal vocabulary and stealth
 - Reduced capability for flexible, independent, loosely coupled operations by naval units
- Surface naval forces (and most airborne assets) are detectable and vulnerable

Technical Opportunities

- Communications: visual signaling for line-of-sight (LOS) links that are not susceptible to intercept
 - Optical: digital flashing light, digital semaphore (QR code), moderate bandwidth
 - Laser: requires tracking and power, potential safety hazard to receiver, high bandwidth
- Sensing for contacts and navigation
 - Multiple low-probability of intercept (LPI) means to provide contact detection, tracking, and identification of friend/foe/neutral (IFFN)
 - Passive electromagnetic (EM) sensing using existing radar/radio receivers
 - EO/IR visual bearing & bearing rate, depends upon on-board classification or entity SA
 - Ekelund ranging can localize (provide range, error estimate) for any detectable contact
 - Knowledge of meteorological phenomenology and local environment improves range
 - Reduce navigation dependence on GPS and EM signaling (celestial, other techniques)
- Adaptive deployment
 - Use low-bandwidth predefined signal books to relay coherent, precise reports & orders
 - Use of relay blimps and altitude changes can affect detection/counter-detection ranges
 - Local-launch UAVs reduce reliance of forward-deployed units on CVN combat air patrol
 - Additive manufacturing (aka “3D printing) can reduce, reshape logistics requirements
 - Vertical LOS provides additional relay opportunities while maintaining stealth
 - Carefully designed UAV maneuvers during transit or loiter can improve range estimates

Tactical Opportunities

- *Stealth*: gain deeper access into battle space, utilize inherent covertness of unmanned systems
- *Surprise*: choose time and place to shift from passive to active use of electromagnetic spectrum
- *Coherence*: formal mission brevity codes are actionable and precise with well-defined semantics
- *Uncertainty*: reduced opponent confidence that threats are located and attack is unchallenged
- *Flexibility*: tactical commanders decide use of NCW/NOW on per-platform, per-mission basis
- *Scalability*: incremental response using low-cost assets avoids destabilizing high-cost escalation
- *Autonomy*: loosely coordinated command via Rules of Operation (ROO) and Engagement (ROE)

References

- Brutzman, Don, Tim Chung, Carol O’Neal, Lyla Englehorn, Jerry Ellis, [Future Unmanned Naval Systems \(FUNS\) Wargame Competition 2011](#), Technical Report NPS-USW-2011-001, Naval Postgraduate School, Monterey California, July 2011. Available upon [request](#).
- Greenert, Jonathan, ADM USN and Chief of Naval Operations, "[Imminent Domain](#)," *U.S. Naval Institute Proceedings*, December 2012.
- *Electromagnetic Maneuver (em2)*, Massive Multiplayer Online War Game Leveraging the Internet (MMOWGLI), February-March 2013. Sponsored by Naval Warfare Development Command (NWDC), Naval Postgraduate School (NPS) and Office of Naval Research (ONR). Accessible via <https://portal.mmowgli.nps.edu/em2>
- “Horatio Nelson, 1st Viscount Nelson,” biographical summary, https://en.wikipedia.org/wiki/Horatio_Nelson,_1st_Viscount_Nelson
- Hughes, Wayne P. Jr., CAPT USN (Ret.), *Fleet Tactics and Coastal Combat*, second edition, Naval Institute Press, Annapolis Maryland, 2000.
- Hughes, Wayne P. Jr., CAPT USN (Ret.) and Kline, Jeffrey R. CAPT USN (Ret.), *Transitioning the Navy to the Twenty-First Century*, Strategic Discussion Group (SDG) briefing, 18 December 2013.
- Kline, Jeffrey R. and Hughes, Wayne P. Jr., *A Flotilla to Support a Strategy of Offshore Control*, monograph, Naval Postgraduate School, 4 December 2012.
- Lucas, Andrew, [DIGITAL SEMAPHORE: TECHNICAL FEASIBILITY OF QR CODE OPTICAL SIGNALING FOR FLEET COMMUNICATIONS](#), Master’s Thesis, Naval Postgraduate School, June 2013. Received NPS Outstanding Thesis Award.
- QR Codes for Visual Signaling and Tactical Chat, <http://qr.nps.edu> which includes a [video demonstration of QR Tactical Chat](#) (with no network connection) by USNA midshipmen Jonathan Driesslen and Daniel Fallon (class of 2014), August 2013.
- Richter, Stephen P., [DIGITAL SEMAPHORE: TACTICAL IMPLICATIONS OF QR CODE OPTICAL SIGNALING FOR FLEET COMMUNICATIONS](#), Master’s Thesis, Naval Postgraduate School, June 2013. Received NPS Outstanding Thesis Award.
- O’Rourke, Ronald, [Navy Network-Centric Warfare Concept: Key Programs and Issues](#), Congressional Research Service, The Library of Congress, updated 31 May 2005.
- Ruble, Robert C. Jr., CAPT USN (Ret.), [Cede No Water: Strategy, Littorals and Flotillas](#),” *Proceedings*, vol. 139 no. 9, U.S. Naval Institute, Annapolis Maryland, September 2013.
- Snyder, Sheldon L., LCDR USN, [Efficient XML Interchange \(EXI\) compression and performance benefits: development, implementation and evaluation](#), Master’s Thesis, Naval Postgraduate School, Monterey California, March 2010.
- Stewart, Kenneth A., [NPS Faculty, Researchers Stand Up New Littoral Operations Center](#),” news release, Naval Postgraduate School, 10 January 2013.
- Whiteneck, Daniel, Michael Price, Neil Jenkins, Peter Swartz, [The Navy at a Tipping Point: Maritime Dominance at Stake?](#), annotated briefing, CNA Center for Naval Analyses, March 2010.
- Williams, Jeffrey Scott, CDR USN, [Document-based message-centric security using XML authentication and encryption for coalition and interagency operations](#), Master’s Thesis, Naval Postgraduate School, Monterey California, September 2009.

Website: <https://wiki.nps.edu/display/NOW/Network+Optional+Warfare>